REMARKS

This responds to the Office Action mailed on July 16, 2008.

Claims 1-23 are now pending in this application. However, claims 1, 11, 21, 22 and 23 are withdrawn from consideration by the Examiner as a result of the restriction requirement. Accordingly, claims 2-10, 12-20 are now under examination.

§102 Rejection of the Claims

Claims 2-10 and 12-20 have been rejected under 35 U.S.C. § 102(e) as allegedly anticipated by O'Keefe (US 2002/0004204 A1) in light of Berlien et al. (US 5,850,195). The Examiner alleges that O'Keefe teaches a method and a device that includes creating at least one stream of light data and transferring it through a substrate (citing O'Keefe paragraph 65, 82 and 83), allowing the interaction of molecules with the substrate (citing O'Keefe paragraph 12), receiving streams of light data transferred through the substrate (citing O'Keefe paragraphs 106-107), and determining the identity of the molecule (citing O'Keefe paragraphs 12, 106-107).

However, rather than outlining the similarities between Applicant's invention and the O'Keefe disclosure, these assertions by the Examiner demonstrate how different the O'Keefe disclosure is from the claims of Applicant's application.

In particular, the first step of Applicant's claim 2 calls for "creating at least one stream of binary data carried by electrical, molecular or light signals." (Note that a similar first step is recited in Applicant's claim 12.)

Applicant's first step has at least two elements that are distinct from the steps in O'Keefe's method and device. First, Applicant's binary data stream is a *binary* stream of data, NOT a mere light signal. Second, Applicant's binary data stream is generated or exists *before* the stream it is passed through a substrate. The binary data is NOT generated from some secondary light signal generated by passage through the substrate.

As described by the Examiner, O'Keefe merely shines light through a substrate surface (or observes some fluorescent signal generated by a reaction on the substrate surface). O'Keefe's light may be of a selected wavelength and/or a filter may be used to generate light of a particular wavelength. However, the light signal transmitted by

O'Keefe's device and method is not a digital signal – instead it is merely a light signal.

O'Keefe clearly teaches that this is so at paragraphs 65, 82 and 83:

> [0065] The signal transmission means is integrated within the microarray substrate…The signal transmission means generally comprises an electrically conducting material, a variety of which are known in the art. … The signal transmission means is in operable linkage, i.e., is operably connected to, the photodetector(s), i.e., the signal transmission means is capable of transmitting the signal generated by the photodiode in response to radiant energy to a reading device...
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> [0082] When the radiant energy is generated by excitation, e.g., exciting a fluorophore with a laser, the incident light from the laser as well as the radiant energy generated by exciting the fluorophore, may be detected. Preferably, only the radiant energy generated by the fluorophore, and not the incident light from the laser, is detected. Various ways of selecting out undesired radiant energy may be employed, including, but not limited to, use of an interference filter layer; use of an optical wave guide; use of a polarization filter; time-resolved fluorescence; use of a grating, or a louver; and varying the angle of incident laser light.
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> [0083] A dielectric interference filter layer may be positioned on the first planar surface, between the polymer layer and the substrate layer comprising the photodetectors. The filter may comprise one or more layers of different dielectric materials of differing thicknesses to achieve an attenuation of the undesired energy wavelengths or to minimize attenuation of a desired wavelength. Such filters are known in the art and are available commercially from a variety of sources, including, e.g., ZC& R Coatings for Optics, Carlsbad, Calif. A polymer may be attached directly to the interference filter layer. The thickness of the interference filter layer can be varied, depending on the wavelength of radiant energy being filtered out. The interference filter layer may have a thickness of from about 0.01 .mu.m to about about 100 μm, from about 0.05 μm to about 50 μm, from about 0.1 μm to about 10 μm. In addition, the interference filter layer may itself comprise more than one layer, the thickness and composition of which may be varied as needed to achieve maximal filtering out of an undesired wavelength(s).

Therefore, O'Keefe fails to create at least one stream of binary data carried by electrical, molecular or light signals *before* transmitting the stream through a substrate.

O'Keefe May Convert Digitize Data Only *After or During* Detection

The Examiner further alleges that O'Keefe teaches creating a digitally encoded molecular current, citing O'Keefe paragraphs 106-107, reproduced below for easy reference.

> [0106] The present invention further provides a detection device for use in conjunction with the substrates of the present invention. A detection device of the invention detects an electrical signal from a photodiode integrated into the microarray substrate. A detection device *can comprise a component which converts the electrical signal into a digital signal*, and can send the electrical signal (or a digitally converted form thereof) to a linked computer, which can store, manage, and process the information received.
>
> [0107] A detection device of the invention comprises an element for immobilizing the microarray substrate; a reading device for reading an electronic signal from a signal transmission means of the substrate; and a microprocessor for storing, managing, and processing information provided by an electronic signal detected by the reading device. Data may also be presented as a digital readout. *Methods and devices for converting a signal emitted from a photodiode into a digital signal are known in the art, and can be used in conjunction with the detection device of the invention.* See, e.g., U.S. Pat. No. 4,990,765; and U.S. Pat. No. 5,850,195.

Accordingly, O'Keefe discloses that a detection device can be used to detect signals from the microarray substrate. According to O'Keefe, the detection device can further comprise a component which *converts* the electrical signal into a digital signal. Paragraphs 106 and 107 clearly indicate that the detected signal may only be converted into a digital signal *after* passage through the substrate.

Clearly, O'Keefe does not disclose or teach generating a stream of binary data *and then* transmitting the stream of binary data through the substrate.

Thus, O'Keefe fails to disclose or teach the following the elements of Applicants claims: "creating at least one stream of binary data carried by electrical, molecular or light signals, [and] transferring the at least one stream of binary data carried by electrical, molecular or light signals through a substrate."

Moreover, the Berlien disclosure does not satisfy any deficiency of the O'Keefe reference or teach any element relevant to the present invention. Instead, Berlien is limited to disclosure of a light-to-digital signal converter. While such a converter may be used by O'Keefe to convert a signal that has already passed through the substrate into a digital signal, such a step is not part of the present invention. Instead, the present invention uses a stream of digital data throughout the input and output steps of the present invention. Hence, the Berlien reference is irrelevant.

Applicant submits that O'Keefe fails to disclose every element of Applicant's claimed invention, even when combined with Berlien. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Significance

The Examiner has asserted that O'Keefe teaching extracting digital data from an electrical signal (citing O'Keefe paragraphs 106-107), and according to the Examiner, "in order to extract digital data from an electrical signal, the signal must be carrying digital or binary data" (Office Action at page 4 (July 16, 2008). Thus, the Examiner asserts that O'Keefe does teach creating a stream of binary data carried by electrical, molecular or light signals.

First, Applicant submits that all electrical and light signals are not binary data. Instead, a light signal is simply a light and electricity is simply a flow of electrons.

Second, Applicant submits that O'Keefe's method and device provides secondary measurement of what may be happening on a substrate, whereas Applicant's method directly detects and records actual changes on the substrate.

As indicated in the text from paragraphs 106-107, O'Keefe's method and device use photodiodes that, when exposed to light of an appropriate wavelength, produce an electrical signal. Hence, O'Keefe uses a series of detectors and converters to sense if and what is happening on the substrate. For example, O'Keefe explains how his device and method works in paragraphs 8 and 9 as follows:

> [0008] In some embodiments, the substrate comprises a first layer and a second layer. The first layer is referred to as the polymer layer and comprises a plurality of positionally distinguishable polymer sequences arranged in spots. The second layer is referred to as the photodetector layer and comprises a photodetector and signal transmission means. The first layer may be detachably positioned on the second layer such that the first layer can be removed from the second layer.
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> [0009] In use, a biopolymer is labeled, directly or indirectly, with a moiety which emits radiant energy, e.g., light. An integrated photodetector which is positioned underneath the microarray spot detects an emitted light signal, and generates an electrical signal corresponding to the intensity of the detected light. Output from the photodetector is transmitted to a reading device by a signal transmission means such as an electrically conducting material integrated into the slide. In some embodiments, each photodetector comprises positional address information.

Therefore, according to O'Keefe, a polymer that emits light is bound or attached to the substrate and photodetectors under the microarray detect the light from the polymer and emit an electrical signal. The output electricity from the photodetector is transmitted to a reading device, or as explained by O'Keefe in paragraphs 106-107, the detecting device can convert the electrical or light signal into binary signal or data, which is stored or manipulated in a microprocessor.

Hence, O'Keefe does not ***directly*** detect or identify a molecule on the substrate due to a change in the substrate's transmission of binary data. Instead, O'Keefe relies upon secondary signals emitted from labeled polymers, photodetectors, reading devices and digital converters to derive what may have occurred on a substrate. At each step of O'Keefe's method the signal may become garbled or lost by a malfunctioning or masked label, detector, or reading device. When such a secondary signal is converted to binary

data after the secondary signal has undergone so many conversions and manipulations, there is no way to know whether that signal is a true reflection of the presence of a molecule on the substrate or whether it is some aberrant flux in fluorescence, electricity from the photodetector or a misprint of the reading device. Hence, extensive controls must be employed in the O'Keefe method to insure that each step of detection and energy conversion is a true reflection of the physical presence of a molecule on the substrate.

However, by using a binary data stream throughout the method, Applicant's claimed invention avoids problems inherent in the art and provides greater flexibility than is possible when prior art methods are employed. In particular, by using a binary data stream is generated *before* the stream it is passed through a substrate, one of skill in the art *directly* detects any perturbation of the stream caused by a change in the substrate (e.g., when a molecule binds or reacts with another molecule). Thus, the skilled artisan can observe and record the binary data stream as it passes through the substrate and before any manipulation of the substrate has occurred. Then, the artisan can introduce one or more changes to the substrate, and directly record what changes occur in the binary data stream. This avoids the need for extensive controls and numerous pieces of equipment (e.g., labels for molecules, photodetectors, signal converters and reading devices, etc.).

Hence, Applicant's invention is like taking a digital picture of molecules on a substrate, whereas O'Keefe's method is like deriving what molecules may be present on substrate from an infrared or NMR spectrum.

Applicant submits that claims 2-10 and 12-20 are novel and distinct over O'Keefe (US 2002/0004204 A1) in light of Berlien et al (US 5850195) and respectfully requests withdrawal of this rejection under 35 U.S.C. § 102(e).

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (516) 795-6820 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 16th day of September 2008.

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